

T04D04 – 4.2 IB Practice MS

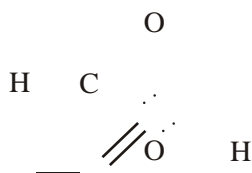
1. (i) tetrahedral (*accept correct 3-D diagram*);
 bent/V-shape/angular (*accept suitable diagram*); 2
 (ii) 105° (*accept $103 - 106^\circ$*);
 lone pairs **repel** each other more than bonding pairs; 2
Do not accept repulsion of atoms.

[4]

2. bonds are polar as Cl more electronegative than Si;
Allow "electronegativities are different"
 molecule is symmetrical, hence polar effects cancel out/OWTTE; 2

[2]

3. (a)



No mark without lone electron pairs.
Correct shape not necessary.
Do not award mark if dots/crosses and bond lines are shown.
Accept lone pairs represented as straight lines.

1

- (b) $O - C - O = 120^\circ / H - C - O = 120^\circ$;
 $C - O - H = 109^\circ / < 109^\circ$; 2
No mark for 109.5°
Accept answer in range $100 - 109^\circ$

- (c) length: $C = O < C - O$;
 strength: $C = O > C - O$;
 greater number of electrons between nuclei pull atoms together and require greater energy to break;
 Or
 double bonds are shorter/single bonds are longer;
 double bonds are stronger/single bonds are weaker; 3
Accept stronger attraction between nuclei and (bonding) electrons.

[6]

4. (i) 3

Allotrope	Structure
Diamond	3D array/network involving tetrahedral carbons/each carbon atom joined to four others;
Graphite	layer structure involving trigonal (triangular) planar carbons/with each carbon atom joined to three others/with hexagonal (six-membered) rings of carbon atoms;
C₆₀ fullerene	truncated icosahedrons; <i>Accept carbon atoms form a 'ball' with 32 faces, of which 12 are pentagons and 20 are hexagons, exactly like a soccer ball. Do not accept soccer ball alone.</i>

- (ii) Diamond: covalent bonds (only);
 Graphite: covalent bonds and the separated layers held together by
 (weak) London/van der Waals'/dispersion forces; 2

[5]